Method And Apparatus For Distribution And Installation Of Computer Programs Across An Enterprise

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BACKGROUND OF THE INVENTION

TECHNICAL FIELD

10   The invention relates to the remote installation of software from one or more central locations to a plurality of remote machines. More particularly, the invention relates to a method and apparatus for distribution and installation of computer programs across an enterprise.

15   **DESCRIPTION OF THE PRIOR ART**

The invention addresses the issue of slow/non-standard operating system (OS) deployment within an enterprise environment. For example, prior systems relied on a user to rename a personal computer (PC) manually during deployment. Prior

20   systems also did not store information in a database and required, for example, over an hour to accomplish the re-imaging of a machine.

It would be advantageous to provide a method and apparatus for distribution and installation of computer programs across an enterprise that did not have such

25   limitations as are attendant with currently available systems.

SUMMARY OF THE INVENTION

The invention provides a mechanism for the distribution and customized installation of computer programs in an enterprise. The presently preferred embodiment of the

5 invention effects the remote installation of a computer program from one or more central locations to a plurality of remote machines, where an image of the computer program and user/user machine information, and an installation utility, are provided to the remote location on a common medium.

10 The preferred embodiment of the invention also provides a controlling installation that allows a user to browse and locate an appropriate software image for a particular platform.

The invention also provides a server-implemented method and apparatus that

15 provides the ability to store installation specific information as an input in a relational database.

One embodiment of the invention automates the process of replacing a computer program, such as an OS on a machine. The user can select the deployment of a

20 required OS for his machine, and standardized applications for that machine as well, *e.g.* applications that are used across the enterprise for such purpose as word processing, browsing, and the like.

In the preferred embodiment, a Linux boot disk is provided to the user for the

25 installation process, and only for the installation process. A centralized database, remote to the user, is maintained that includes characteristics of users and/or their

machines, which characteristics are used to customize one or more computer programs, such as an OS, for a particular installation. The database can be updated by enterprise user-services personnel.

5   An image of each of the computer programs is maintained at one or more locations that are remote to the user/machine. An image of information that is accessed from within the database is used to configure the computer programs for a particular user and/or user machine. The image of the computer program and of the database information are downloaded to a destination machine on, for example, a Linux-based

10   medium that also includes a utility for installing the image at the destination machine. The Linux-based medium is used to install the computer program at the destination and automatically configures the program using configuration settings for the user/machine from the database that were imaged on the medium with the program.

15   In particular, a presently preferred embodiment of the invention provides a method and apparatus for distribution and installation of computer programs across an enterprise, that comprises storing characteristics of users and user machines on a database; imaging at least one computer program at a location remote from said user machines; imaging said characteristics of users and user machines for said at

20   least one computer program at a location remote from said user machines; downloading to at least one specified destination user machine at least one imaged computer program and corresponding characteristics of users and user machines for both said imaged computer program and said specified destination user machine, wherein downloading is accomplished via a download medium, and wherein an

25   installation utility for said imaged computer program accompanies said download medium; installing said computer program from said download medium at said

destination user machine, wherein said installation is accomplished by said installation utility; and auto-configuring said computer program for said destination user machine in accordance with said corresponding characteristics of users and user machines.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block schematic diagram showing an enterprise;

10 Fig. 2 is a block schematic diagram showing an enterprise in which computer programs may be distributed and installed according to the invention; and

Figs. 3a-3c are flow diagrams showing installation and configuration of a computer program from a boot disk image according to the invention.

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DETAILED DESCRIPTION OF THE INVENTION

The invention provides a mechanism for the distribution and customized installation of computer programs in an enterprise. The preferred embodiment described herein

20 is referred to as a Linux imaging system, and is a disk-imaging solution in a OS deployment mechanism with capabilities of entitlement derived through integration with an enterprise directory. The mechanism described provides cost savings associated in time and manpower. A related aspect of the invention involves the economic savings experienced by allowing the automation of re-imaging of certain

25 platforms to include software implementation in an enterprise environment.

Fig. 1 is a block schematic diagram showing an enterprise as the type in which the invention may be practiced. Those skilled in the art will appreciate that the invention may be used with other network configurations, *e.g.* the distribution of computer programs for game consoles, set top boxes, hand held devices, and the like.

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The enterprise of Fig. 1 comprises a plurality of user machines 101-104, which may be personal computers or other user devices, which are communicatively connected to a server 106 by a network 105. The network of Fig. 1 may be a virtual private network or a global telecommunications network, such as the Internet. The server

10   may comprise a single server, several servers collocated in a server farm, or several servers at various locations.

Fig. 2 is a block schematic diagram showing an enterprise in which computer programs may be distributed and installed according to the invention. The presently

15   preferred embodiment of the invention effects the remote installation of a computer program from one or more central locations, *e.g.* from a central server 206, to a plurality of remote machines, such as PCs 201, 203, where the PCs and the server are communicatively coupled via a network 205, such as a virtual private network, or a global telecommunications network, such as the Internet. An image of the

20   computer program and user/user machine information, and an installation utility, are provided to the remote location on a common medium, such as a boot disk 202, 204.

The preferred embodiment of the invention also provides a controlling installation that allows a user to browse and locate an appropriate software image for a

25   particular platform. This aspect of the invention is implemented with standard browser technology on the user's machine 201, 203, where such browser is used to

access the database, for example through a Web site front end of the database. Such systems are known to those skilled in the art.

The invention also provides a server-implemented method and apparatus that
5   provides the ability to store installation specific information as an input in a relational database. For example, user/user machine information may be input to a configuration database 207 by any of users, department managers, and system administrators.

10   One embodiment of the invention automates the process of replacing a computer program, such as an OS on a machine. The user can select the deployment of a required OS for his machine, and standardized applications for that machine as well, *e.g.* applications that are used across the enterprise for such purpose as word processing, browsing, and the like.

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In the preferred embodiment, a Linux boot disk 202, 204 is provided to the user for the installation process, and preferably only for the installation process. The disk in this embodiment is a physical disk that is delivered to the user by a physical delivery mechanism, such as through the mail; or the disk may be maintained in the
20   possession of an installation technician who would perform the actual installation from the boot disk.

While Linux is described herein in connection with the presently preferred embodiment of the invention, those skilled in the art will appreciate that any other
25   boot technology can be used. Further, while a boot disk is described, those skilled in the art will appreciate that the disk may be any of a physical disk, such as a CD, or it

may be a virtual disk, such as a software download.   Further, the disk may be a single disk or a combination of more than one disk, where both virtual and physical disks may be employed.

5   A centralized database, *e.g.* configuration database 207, remote to the user, is maintained that includes characteristics of users and/or their machines, which characteristics are used to customize one or more computer programs, such as an OS, for a particular installation.   The database can be updated by the user, enterprise user-services personnel, or others as appropriate, as discussed above.

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An image of each of the computer programs is maintained at one or more locations that are remote to the user/machine, *e.g.* at an image server 208. An image of information that is accessed from within the database is used to configure the computer programs for a particular user and/or user machine. The image of the
15   computer program and of the database information is downloaded to a destination machine on, for example, a Linux-based medium as discussed above, that also includes a utility for installing the image at the destination machine. The Linux-based medium is used to install the computer program at the destination and automatically configures the program using configuration settings for the user/machine from the
20   database that were imaged on the medium with the program.

The system uses PHP scripting to gather information about the machine by asking the user for information and querying the BIOS (CMOS) for information, such as Serial Number, Asset Tag, Machine Manufacturer, BIOS version, and Chassis Type.
25   If the machine already has a record in the database, any changes to the machine information are recorded to the machine record in the database. After updating the

database, the system queries the user for deploying a new image. Once the user has chosen an image to deploy, answer files are created based on the information that the user entered, as well as the type of image that the user choose and written to a temporary location. The image is then delivered and the answer files are written

5   to be deployed, *e.g.* Administrator password, Machine Name, Time Zone, Machine specific drivers.

The invention also provides a Web portal for management of the database. This Web portal allows for searching of the database, for example, based on machine

10   location, name, and asset tag. It also allows for listing all machines, for example, by site, building, and type. Finally, the Web portal allows for editing/deleting of machine records so that an image may be postponed if an error is found.

Figs. 3a-3c are flow diagrams showing installation and configuration of a computer

15   program from a boot disk image according to the invention. In Fig. 3a, a boot disk is inserted into the drive of a destination machine and the machine boots to boot code contained on that disk (301). The user is shown a menu (302) that comprises a busy.img (303) while the boot process continues. In the preferred embodiment, the boot process involves such functions contacting an imaging server, identifying scripts

20   that may be required for the installation, and initializing the installation utility.

Once the initialization process is complete, various boot scripts are run (304) to accomplish such functions, for example, as establishing connectivity, *e.g.* NIC/SCSI, acquiring an IP address, mounting drives, and running one or more shell scripts.

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Once a shell scripts begin running, various imaging scripts may be run (Fig. 3b; 305), as well as other commands to the system that are part of the installation process.

A script is run (306) to access the database for machine information that is used for customization during the installation. This information may be displayed to the user for confirmation of its validity.

The process then gathers information (307) for the database concerning the destination machine and writes the information to the database.

The process next writes the image files, as customized, to the machine's hard drive (Fig. 3c; 308).

Finally, the machine is rebooted (309).

Exemplary Embodiment

The presently preferred imaging system is a delivery mechanism for deploying an operating system in the form of a single file, *i.e.* an image, to multiple machines/machine types.

The invention may be implemented using various known components to work together to automate a procedure that had been a very complex and time-consuming process in the past. The preferred embodiment is realized using the known components shown in Table 1 below.

Table 1. Exemplary Embodim nt

Compon nt	Function	Information Available At:
BusyBox	Used for boot disk.	www.busybox.net
PQIdeploy	Used to deploy image.	www.powerquest.com
PQAccess	Used to push answer files into newly imaged machine.	www.powerquest.com
Sybase Open Client	Used to connect to the database.	www.sybase.com
DMIDecode	Used to query BIOS for information.	www.nongnu.org/dmidecode
PHP	Used to script process	www.php.net
Dialog	Used as menu scheme for the system.	hightek.org/dialog

Although the invention is described herein with reference to the preferred embodiment, one skilled in the art will readily appreciate that other applications may

5   be substituted for those set forth herein without departing from the spirit and scope of the present invention. For example, image information may comprise both a computer program and customization information from the database; or it may comprise computer program information, where the customization information is obtained from the database via a network as part of the installation process. Similar

10   variations are also contemplated by the inventors.

Accordingly, the invention should only be limited by the Claims included below.